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ABSTRACT

Noting the general lack of research on handwriting instruction, a study examined hand and eye dominance, hand positions, and handwriting production of children. Subjects were 310 children from grades one through five in classrooms of regular children, mainstreamed team teaching classrooms, and self-contained gifted classes in a large elementary school in south Florida. Subjects wrote the letters of the alphabet, some other short passages for copying, and then wrote about whatever they wished. Subjects' eye dominance was also determined, and scores from standardized achievement tests in math and reading were collected. Results indicated: (1) no significant relationship between handwriting position and grade level; (2) significant relationships among dominances and hand positions; (3) no significant relationship between school placement and handwriting position, or between eye-hand dominance and school placement; and (4) no significant differences for reading achievement or math achievement due to eye dominance, no differences due to handwriting position in reading or math achievement, and no gender differences in eye dominance or handwriting position. Findings question previous assumption that handwriting positions form developmentally. Findings suggest that teachers must realize that all children do not need to hold their writing tools in the same manner. (Contains 19 references, 6 tables, and 3 charts of data.) (RS)

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Emerging Issues in Handwriting Instruction

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Emerging Issues in Handwriting Instruction

Even a casual search of recent educational literature confirms the lack of interest held for handwriting issues. It is clear that high levels of interest in handwriting have not been prevalent among researchers for many years. A current ERIC survey produced one handwriting reference dated 1993 and one dated 1992. Obviously, the search was not exhaustive, yet it is perfectly clear that educational journals are not publishing extensively on handwriting.

Over the last twenty years, handwriting interest has decreased and given way to a focus on a much more important aspect of education --- written composition. One of the most important purposes for the use of handwriting is to facilitate composing. This focus on composing has been the catalyst for some of the most important and positive changes in literacy acquisition during the last two decades. Rightly, handwriting is no longer equated with "writing" as it was a few years ago. Handwriting is a mechanical process and needs to be viewed in its role as *supporting composition* rather than as an end in itself. It is time for handwriting to be viewed in its rightful position --- as a support tool for writing.

Once the value of handwriting is in perspective, it becomes clear that legibility in communication, rather than producing a standard model, is the real purpose of handwriting. Individuals function differently on a number of variables (hand position and grip, for example) that affect the handwriting product, so why is it unreasonable to think that there would be many variations of acceptable standards of handwriting?

Variables Affecting Individual Handwriting

Visual field: The area where central vision focuses and where reading fixations occur is called the visual field and is controlled by the right or left hemisphere of the brain. The right and left visual field positions vary, so that reading fixation fields are different depending on brain hemispherization.

Eye Dominance: Related to visual field, most people have one eye that is dominant as determined by the hemispherization control of the eyes. The left hemisphere of the brain usually controls the right eye, making it the dominant eye, leading to use of the right visual field. The reverse is true for the right side of the brain.

Handedness: Similarly, the opposite side of the brain controls handwriting motor functions. The left hemisphere controls the right hand; the right hemisphere controls the left hand.

Mixed Dominance: Individuals may have the same dominance for eyes and hands or they may be mixed. Right eye dominance may be paired with left hand dominance or left eye dominance may be paired with right hand dominance.

Pencil Position: This variable may be learned and may be changed with instruction. There are six basic pencil positions:

Right or Left Vertical: This position is recommended by most commercial handwriting programs. The pencil is vertically aligned with the arm. The eraser of the pencil is aimed at the elbow.

Right or Left Horizontal: In this position, the pencil rests closer to the joint that connects the forefinger to the hand than to that of the thumb. The pencil is 45 to 60 degrees from the arm and the eraser of the pencil is aimed to the right or left of the writer.

Right or Left Inverted: The wrist is inverted and the eraser of the pencil is away from the body. This is the position long called "the hook".

Paper Position: Although paper position is standard, as determined by hand dominance, in most handwriting programs, consideration must be given to the need for individual positioning depending on the other variables.

Although there are many degrees of differences among the ways that students hold their paper, some positions that have been identified are:

Left slant: The paper is slanted at a 45 degree angle with the top of the paper facing left. This position is usually recommended by commercial programs for right handed writers.

Right slant: The paper is slanted at a 45 degree angle with the top of the paper facing right. This position is typically recommended for left handed writers.

Straight: The paper is placed vertically in front of the writer. For beginning right handed students using the ball and stick manuscript, this position has been traditionally recommended.

Horizontal: The paper is placed horizontally in front of the writer. Left handed writers typically place the top of the paper to their right side and the reverse is true for right handed writers.

Our Research Interests in Handwriting

As professors in teacher education programs, we are involved both with preservice teachers and with elementary-aged pupils through our teaching interns. Our university students have difficulty becoming good models with their own handwriting, and they find little support for handwriting instruction in the elementary schools. Because of the seeming lack of interest in handwriting, we decided to explore the status of handwriting in one elementary school.

In this article, we consider handwriting issues of the past, chart some emerging concerns, and share descriptive and comparative data on the findings of our study.

Issues of the Past

From the literature on handwriting, it may be determined that two styles of penmanship, manuscript print and cursive script, have dominated the American classroom for nearly a century. Manuscript print is usually taught when children initially enter school. Within two or three years, it is gradually replaced by cursive handwriting (Early, Nelson, Kleber, Treagoab, Huffman, & Cass, 1976).

For several decades, much of the discussion regarding handwriting instruction has centered on whether one style, manuscript or cursive, should be recommended; whether it is advisable to begin an initial style and then change two

or three years later; and on the comparative facets of the two styles, such as speed and legibility. Prior to the 1980s, the basic programs were a ball and stick manuscript print and a slanted script-like cursive. Consequently, the literature prior to 1980 represents those two styles.

Manuscript or cursive?

Support for the prevailing instructional practices of introducing manuscript print first, followed by cursive handwriting was found in tradition rather than in a research base. The rationale for teaching manuscript print as the initial handwriting methods included:

1. Some methods have straight lines and circles and these symbols have been judged in the past as better suited to the eye-hand coordination of young children.
2. The symbols used in vertical manuscript print styles are similar to the symbols used for the print which children are beginning to read.
3. Manuscript print is more legible. (Herrick, 1955)

Researchers in exceptional student education took opposition to the tradition of introducing manuscript as the first handwriting method and recommended teaching cursive as the initial handwriting style. The advantages of cursive as the initial handwriting method were summarized by Kaufman & Biren (1979) as follows:

1. Cursive is continuous.
2. Cursive is connected.

3. Commonly confused letters no longer look alike in cursive style.

4. Cursive writing is highly motivating.

Early (1973), in his support of cursive as the initial handwriting style, contended that the rhythm found in the production of cursive is not found in the printed manuscript. Barham (1974) added support for that contention by suggesting that cursive, if taught in a stroke-by-stroke method as print is taught, would leave children as frustrated with cursive handwriting as many children are with the block printing of manuscript.

Cursive writing was proposed as an aid to spelling and reading (Kaufman & Biren, 1979). These writers asserted that because there are fewer strokes to learn in the cursive style, it is easier for children to write. Their proposal was aimed at exceptional children, but they stated that the principles set forth may apply also to children not in exceptional education.

An educator from Denmark supported the proposal that cursive writing aids the reading process (LaCour, 1980). She stated, "The early practice of cursive handwriting will strengthen the process of learning how to read, because children will become familiar with the appearance and name of each letter from the very beginning." (p. 162). Her rationale was that when children transfer recognition of a printed symbol into a cursive symbol, they must have the cooperation of the visual, auditory, and kinesthetic areas of the brain. According to LaCour, it is advantageous to the children to make this close discrimination, strengthening the transfer of one visual symbol to another.

The majority of the literature that questioned the tradition of teaching manuscript as the initial handwriting style or suggested the introduction of cursive as the beginning handwriting method was based on opinion or observation. One study, however, conducted by Early, et. al, 1976, evaluated a group of children whose first instruction was in cursive handwriting and found that beginning handwriting with the cursive style was not detrimental to the children's progress in reading and spelling. Furthermore, they found that children who were taught cursive as the initial handwriting style scored significantly higher in word reading and spelling than those children who were taught by the traditional methods.

Other Handwriting Questions

Other areas of research in handwriting have centered on the differences between the two styles in speed (Freedman, 1946; Hildreth, 1944) in which neither was found to be faster, and legibility (Turned, 1930; Freeman, 1946) with again no clear-cut differences. In two studies by Spillman, Linder, Hutchcraft, & Martin (1983), comparisons were made on children's ability to comprehend materials written in cursive as opposed to manuscript. Children in grades four, five, and six were given informal reading inventories (IRI), administered in printed format in order to determine their instructional levels of reading levels. They were then administered another form of the same IRI on their instructional level; but it was presented to them the second time handwritten in the cursive style. In grades four and five, children comprehended significantly better when reading print (manuscript) rather than cursive. The difference was shown by whether or not

they were able to achieve the same instructional level with the cursive style as with the manuscript print. In most cases, fourth and fifth grade children were not able to do so. In the sixth grade, there were no differences. The implication of that research is that in elementary grades, texts should be given to children in printed rather than cursive format if a judgment is being made of what the child knows about the content rather than how well he or she can read in cursive. It also verified that instructional reading levels are higher when reading print than cursive handwriting.

During the 1970s, much interest was stirred with regard to materials and instructions for letter formation and practice. Several contradictory studies debated the question of whether instruction should include copying handwriting models or tracing dots that gradually faded away (Birch & Lefford, 1967; Askov, Otto, & Askov, 1970; Hirsch & Niedermeyer, 1973). Askov & Greff (1975) settled the issue with the finding that copying is superior to tracing for practice.

During this period of time, interest grew in the relationship of the perceptual senses to the formation of letters. Particularly, researchers were interested in the influences of auditory processes, visualization, and verbalization during the production of letters. Hayes (1982) studied kindergarten and third grade students in various conditions of perceptual prompts and compared these conditions to copying practice with no prompts and also with a control group. Visual and verbal demonstrations along with the child's spoken verbalization of the stroke sequence

were standard for the condition that produced letterlike forms that were significantly like the models.

A standard practice in elementary schools has been that students change slowly to cursive writing with deliberate alterations during the teaching of transitional strokes. Trap-Porter, Gladden, Hill, & Cooper (1983) questioned the appropriate size of paper as children begin that transition. They examined second and third grade students using both large-spaced paper and normal writing paper for competency in letter formation. Their recommendation supported the use of large-spaced paper even through the transitional stages.

Early in 1980, a public school administrator chastised the educational field for its handwriting practices. He wrote, "Handwriting is the most neglected, least understood, and poorest taught skill area in U. S. elementary schools." (Robison, p. 82). This article, though not a research study, pointed out many frustrations that teachers have regarding the tradition of children learning one style of print and merely two to three years later, unlearning and relearning another style. He pointed out that ball and stick printing is related to finger and hand movements while cursive requires large arm muscle use. He stipulated that the goals of a handwriting program should be clean, clear letter formation with economy of time and effort while maintaining comfort for the writer. He also advocated allowances for left-handed writers to accommodate them for comfort and ease. His answer to the problems discussed in the article was the introduction of an italic cursive style. With his program, children would initially learn the italic script and that would be

the only system they would use. He argued that the upper case letters are closely proportioned to the lower case and that they resemble the printed letter type, thus receiving support from the issue of likeness. For the past two decades, slanted italic-type programs, such as D'Nealian (1981), have been available and have been growing in use over the country.

The article of greatest interest to us was one that described hand positions as indicators of brain hemispheric organization (Wellman, 1983). In her article, Wellman characterized the right handed vertical and left handed inverted positions as "typically people who have left-hemisphere specialization for analytic, sequential and language processes, and right hemispherization specialization for holistic, spatial and non-language processes." (p.55). She also suggested that hand positions change developmentally with younger children favoring the horizontal position or somewhere between the inverted and straight (vertical) positions, later conforming to the vertical position.

Wellman's contention was that "a particular hand position is used because of underlying neurological organizational patterns" and that maturational rate is a related factor. Although she mentioned the adverse effects of changing a child's writing from left to right hand, she did not include the results of handwriting instruction on these positions.

Current Interests:

Based on interest generated from the lack of meaningful literature on handwriting instruction, excluding the fascinating article by Wellman (1983), we constructed a set of questions that we wanted to explore:

1. Are there grade level differences in hand position? (Is it really a maturational factor?)
2. Are there relationships between hand position and eye dominance? (What percentages of children have mixed dominances?)
3. Are there relationships between hand dominance and school placement?

The school placements examined were:

- a. Gifted, referred to as MWA for *major work area*, comprised of students who are considered to be in the superior range as determined by assessment with individualized intelligence tests.
- b. Specific learning disabilities, referred to as LD or SLD, comprised of 2/3 regular students and 1/3 children with mild specific learning disabilities; they are served by a certified special education teacher collaborating with a regular teacher. Students are mainstreamed as opposed to being pulled out of the program. This model is often called the team-teaching model.
- c. Regular placement, referred to as REG, is the classroom with a heterogeneous combination of students functioning at a given grade level.

4. Are there relationships among reading achievement, math achievement, eye dominance and hand position?

5. Is there any evidence that children with mixed dominance may have trouble with reading but ease with math? (Over morning coffee with a local optometrist, this question was formed because he indicated that he had noticed ease with math as opposed to reading among many of his mixed dominance patients.)

6. Are there sex differences in eye dominance or handedness?

Collection of Descriptive Data

During the spring of 1993, we sampled classrooms from a large elementary school in South Florida and visited those classrooms to study the hand and eye dominances, hand positions, and handwriting production of 310 children from grades one through five in classrooms of regular children, mainstreamed team teaching classrooms and self-contained gifted classes. For each grade except first, there were three types of classes: regular (REG), specific learning disabilities-team teaching (SLD), gifted (MWA).

The handwriting samples were collected with a group activity. Students were asked to write the letters of the alphabet (a sample was on the page), some other short passages for copying, and then space was provided for them to write about whatever they wished. During the writing time, both of us stood behind each child's elbow and determined the handwriting position together. Then we

determined each child's eye dominance through a procedure recommended by Dr. Bruce Senior, Optometrist. The procedure was as follows:

An E drawn the size of an inch square was printed on the chalkboard, and twenty feet were measured and marked from the board. As children lined up for their eye dominance determination, they were asked to put toes on the line and to look through the two feet by two feet cardboard square in which a hole the size of a number two pencil had been pushed. Each child was instructed to hold elbows straight in front and look through the hole with both eyes open to find the E. One of us held an eye cover, and one watched the eye movements and facial expressions. As we covered one eye, it was instantly clear whether the child could still see the E or not. The eye with which the child could see the E when the other eye was closed was the dominant eye. The dominant eye was at work when the E was initially spotted through the card. If the card was not moved, the dominant eye would be the only eye that could still see the E.

Math and Reading Scores

During that spring, all students in the school took standardized achievement tests, so we compared the total math and total reading scores (Comprehensive Test of Basic Skills: CTBS) of students with varying hand positions and eye dominances.

Data Analysis

Chi Square analysis was used to determine if there was a significant relationship between handwriting position and grade level. Wellman (1983) had indicated a maturational effect on position, so grade level differences were expected.

Another area of inquiry for which data were analyzed with the Chi Square analysis was regarding relationships among the hand positions and eye/hand dominances.

The relationship between school placement (regular classroom, specific learning disabled classroom (LD), or gifted (MWA), and handwriting position was also studied with a Chi Square analysis.

One way analysis of variance was used to examine differences in reading achievement and math achievement due to eye dominance.

T-tests for paired samples were used to determine differences in math and reading scores in students with mixed dominance.

Results

A Chi Square analysis of handwriting positions (Left and right vertical; left and right horizontal) by grades one through five failed to show any significant differences by grade level. See Chart 1 for percentages of hand positions at different grade levels and Table 1 for the chi square values.

With the Chi Square analysis, significant relationships among dominances and hand positions were found. The values are shown in Table 2.

Table 1

Relationship between Handwriting Positions and Grade Level

<u>Chi Square</u>	<u>Value</u>	<u>DF</u>	<u>Significance</u>
Pearson	19.60154	12	.07501
Likelihood Ratio	19.55167	12	.07606
Mantel-Haenszel test for linear association	1.98903	1	.15844

Minimum Expected Frequency: .808

Cells with Expected Frequency < 5-6 of 20 (30%)

Table 2

Relationship between Dominances and Handwriting Positions

<u>Chi Square</u>	<u>Value</u>	<u>DF</u>	<u>Significance</u>
Pearson	142.72953	6	.00000
Likelihood Ratio	114.41426	6	.00000
Mantel-Haenszel test for linear association	6.02414	1	.01411

Minimum Expected Frequency: .580

Cells with Expected Frequency < 5-3 of 12 (25%)

Chart 1

GRADES 1 THROUGH 5
PERCENTAGES OF HANDWRITING POSITIONS

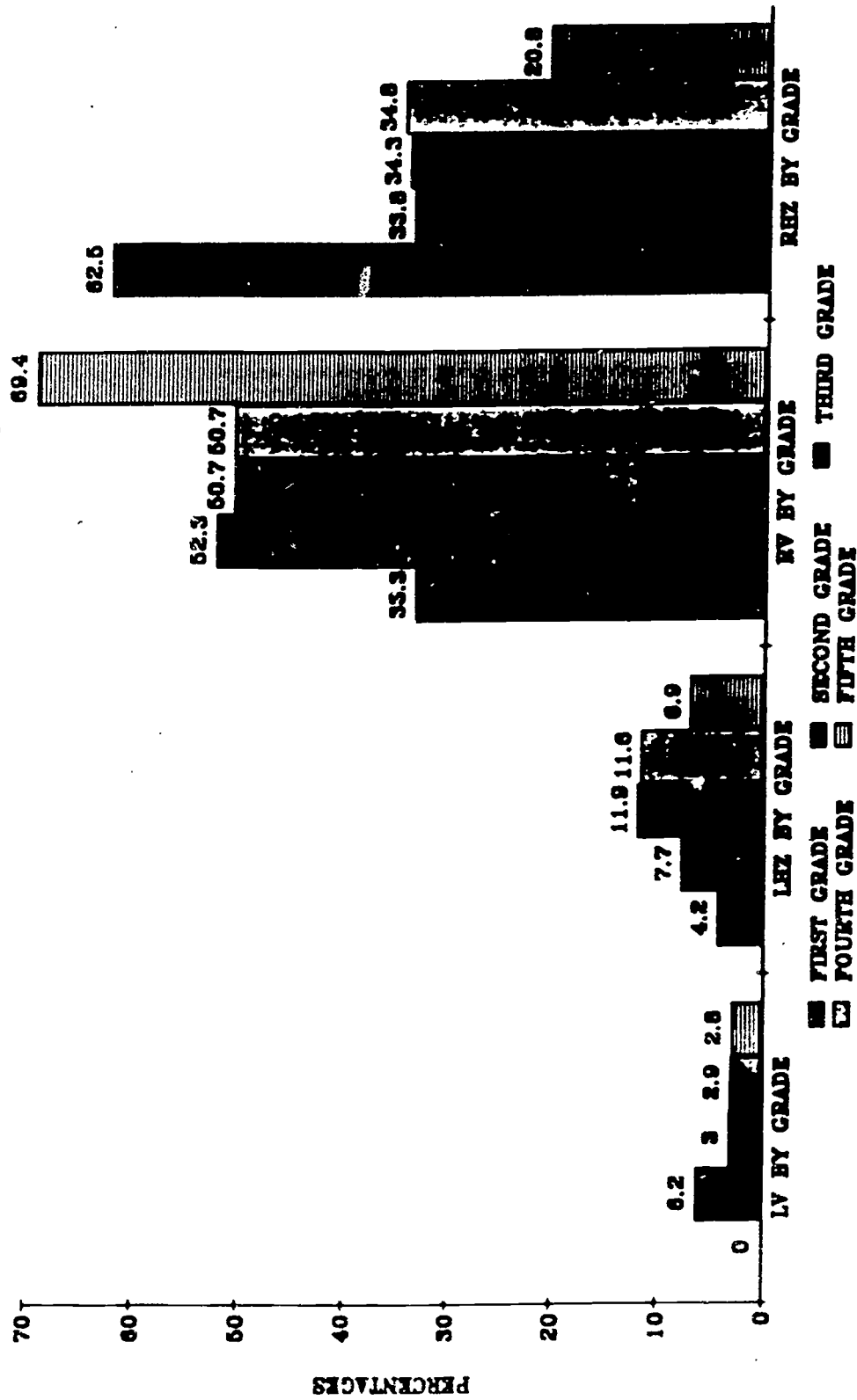


Chart 1

For the question of the relationship between school placement (regular classroom (REG), specific learning disabled classroom (SLD), or gifted (MWA) and handwriting position, no significant relationship was found with a Chi Square analysis. Eye-hand dominance and school placement were also found to have no significant relationships with the Chi Square analysis. See Charts 2 and 3 and Table 3.

Table 3

Relationship between Dominances and School Placements

<u>Chi Square</u>	<u>Value</u>	<u>DF</u>	<u>Significance</u>
Pearson	3.61584	4	.46048
Likelihood Ratio	3.43438	4	.48793
Mantel-Haenszel test		0	
for linear association	1.27731	1	.25840

Minimum Expected Frequency: 2.125

Cells with Expected Frequency < 5-1 of 9 (11.1%)

DOMINANCE BY PLACEMENT

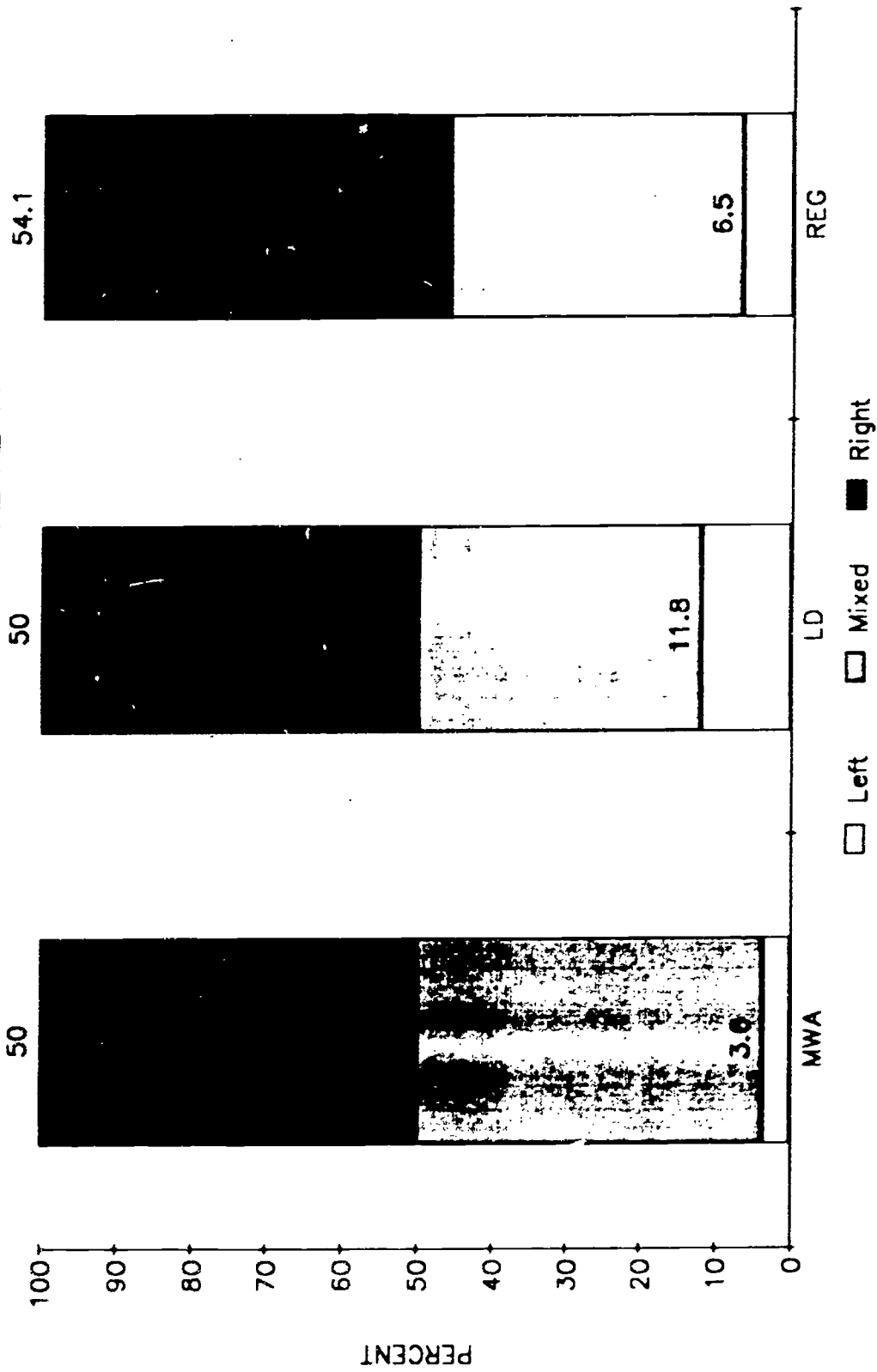


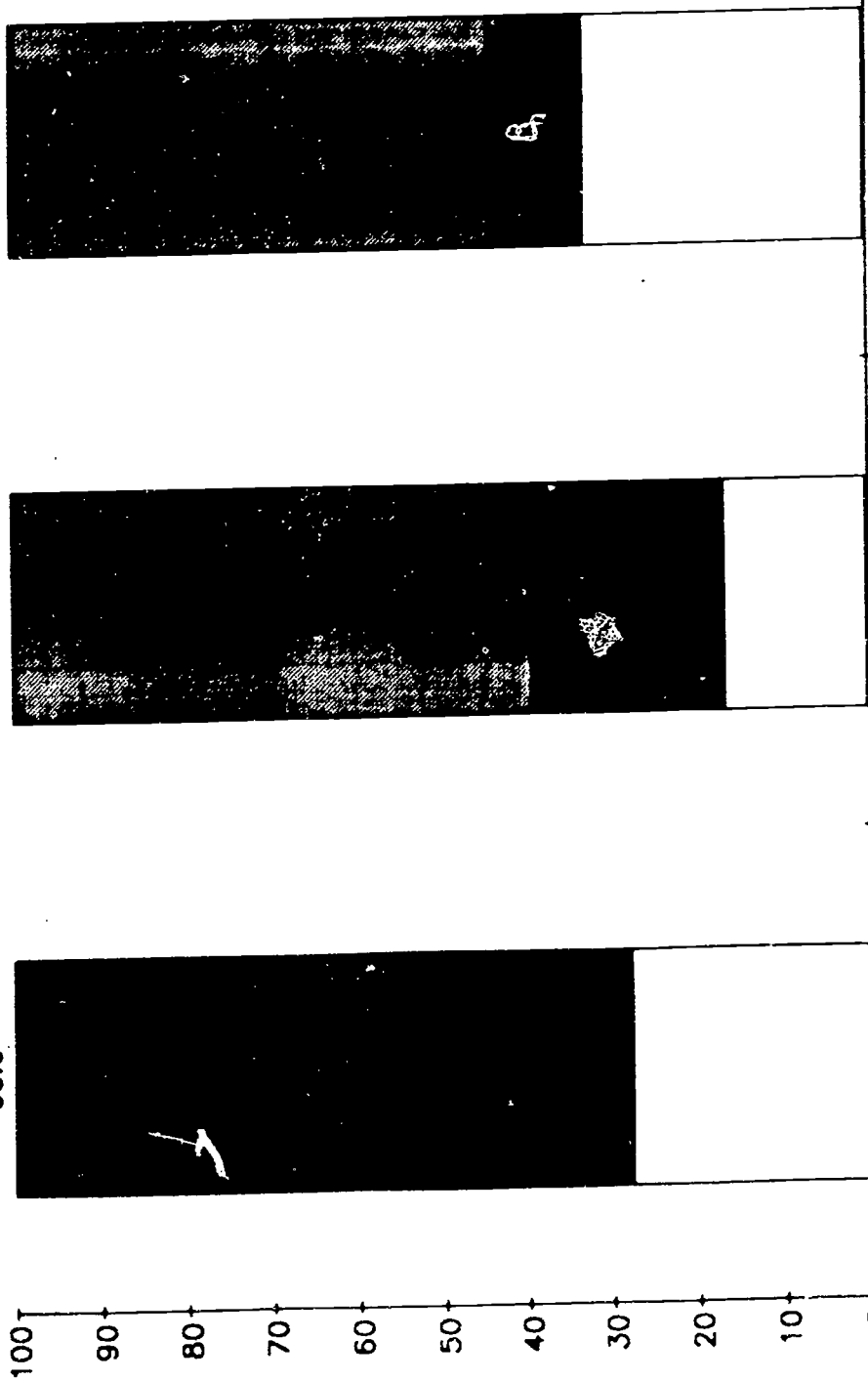
Chart 2

PLACEMENT BY DOMINANCE

56.3

61.1

60.9



DOM MIXED

DOM LEFT

DOM RIGHT

MWA
 LD
 REG

Chart 3

23

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24

One way analysis of variance showed no significant differences for reading achievement or math achievement due to eye dominance. There are no differences due to handwriting position in reading achievement or math achievement. One way analysis of variance found no gender differences in eye dominance or handwriting position.

T-tests for paired samples were used to determine differences in math and reading scores in students with mixed dominance. For both gifted students and students in regular classrooms, the mean math scores were significantly higher than the mean reading scores [Gifted: $p = < .000$; Regular: $p = < .001$]. For the SLD students, the mean differences were not significant ($p = < .667$). See Tables

4, 5 & 6.

Table 4

T-tests for Paired Samples Comparing Reading and Math Achievement Scores of Mixed Dominance Students in Regular School Placement

Variable	# of pairs	Corr.	2-tail sig.	Mean	SD	SE of Mean
CTBS Reading Total	65	.757	.000	5.4308	1.895	.235
CTBS Math Total				6.0154	1.988	.247
Paired Differences						
Mean	SD	SE of Mean	t-value	df	2-tail sig.	
-.5846	1.357	.168	-3.47	64	.001	
95% CI (-.921, -.248)						

Table 5

T-tests for Paired Samples Comparing Reading and Math Achievement Scores
of Mixed Dominance Students in Gifted School Placement

Variable	# of pairs	Corr.	2-tail sig.	Mean	SD	SE of Mean
CTBS Reading Total	39	.419	.008	7.4872	1.073	.172
CTBS Math Total				8.2821	.916	.147

Paired Differences

Mean	SD	SE of Mean	t-value	df	2-tail sig.
-.7949	1.080	.173	-4.59	38	.000

95% CI (-1.145,-.445)

Table 6

T-tests for Paired Samples Comparing Reading and Math Achievement Scores
of Mixed Dominance Students in SLD School Placement

Variable	# of pairs	Corr.	2-tail sig.	Mean	SD	SE of Mean
CTBS Reading Total	3	.918	.260	4.3333	2.517	1.453
CTBS Math Total				4.6667	2.887	1.667

Paired Differences

Mean	SD	SE of Mean	t-value	df	2-tail sig.
-.3333	1.155	.667	-.50	2	.667

95% CI (-3.202,-2.535)

Discussion of Results

Since our intent was to describe an elementary school population's handwriting characteristics, one of our most important questions related to how children change with age in regard to how they hold their writing utensils. Lack of significant differences in hand position by grade level was a surprising finding in that Wellman (1983) had specifically tied hand position to maturation. Her assumption was that young children begin writing with a hand position between the inverted and vertical position and eventually mature to use the vertical position.

In our data, however, there was a trend toward the move from right horizontal to right vertical for right handed children, although for left handers, the move was from vertical to horizontal. The vertical position is, of course, the preferred position as is taught in most commercial handwriting programs. The effects of teaching may be as much a factor as the effects of maturation.

As Chart 1 indicates, most of the participants in this study use either the vertical or the horizontal positions. The other positions were found minimally, although they should be mentioned here. There were 310 students in the population and 297 of them used either the vertical or horizontal position. Thirteen students made up a combination of either the inverted position or what we called the "inside" position because the pencil eraser was pointed toward the body, as opposed to either the elbow or outside the body.

A significant relationship was determined between handedness and eye dominance. In this study, a student with a left dominant eye and left dominant hand had a 70.6% chance of writing with a left horizontal position and a 29.4% chance of writing with a left vertical position. For the right dominant eye and hand person in this study, the chances were 60.0% that the vertical position would be used and 39.4% that it would be horizontal. If a person were left hand dominant and right eye dominant, the chances for the left vertical position were 4.1%; chances for the left horizontal position were 12.4%. For the right handed-left eyed person, the chances were 54.5% that the writing position would be vertical and 28.9% for a horizontal slant.

It is obvious that in this study those participants who were of like dominance, with both eye and hand of the same brain control, the predictions of hand positions are much easier: right hand and eye dominances use the vertical position and left hand and eye dominances use the horizontal position. When the dominances are mixed, prediction is not as clear.

Although no significant relationships were found between school placements and dominances, the percentages of participants in various placements according to dominances are interesting. Charts 2 and 3 show the percentages from two perspectives. When looking at dominance by placement, it is noteworthy, although not statistically significant, that there are fewer left handed students in the gifted program than in either of the other two placements. (MWA: 3.6%; LD: 11.8%; Regular: 6.5%) It is also clear to the eye from the graph that there are

few differences among the mixed dominance students in placement. (MWA: 45.4%; LD: 38.2%; Regular: 39.4%) Although the differences are small and not statistically significant, it is none-the-less interesting to note that MWA children had the largest incidence of mixed dominance and the learning disabled had the least.

When looking at Chart 3, Placement by Dominance, one of the most salient features is the contrast of numbers of left handed students in each of the programs: MWA:16.7%; LD: 22.2%; Regular: 61.1%. In looking at mixed dominance students, 32.8% are in a MWA program; 10.9% are in an LD program; and 56.3% are in regular classrooms.

The question of how mixed dominance might affect school achievement was first discussed with Dr. Senior, our consulting optometrist. It was his observation that in his clinical practice, many children who were his patients for visual corrections and who were also of mixed dominance had more reading problems than math problems as reported by the children and their parents. These data support Dr. Senior's observations.

The t-tests for paired samples compared the total reading and total math scores from the CTBS standardized battery and for the regular placement students and gifted students who were of mixed dominances, the math scores were significantly higher than the reading scores. With LD students, the differences were not significant, but the numbers were much smaller and could be a factor in the results.

Conclusions:

A study of introductory psychology produces the realization that for humans' use of vision for reading or writing, there are left and right visual fields in which the eye fixations occur. One visual field is usually dominant; the left or right field dominates and is controlled by the opposite side of the brain. Most people also have a dominant hand and it may be the combination of visual fields (where fixations occur) and the dominant hand that determine handwriting position. It seems logical that writers and readers need to position their hands and utensils on the paper to accommodate the best vision for reading or producing print.

In trying to describe an elementary school population's hand and eye dominances and corresponding handwriting positions, this study brings into question the previous assumption that handwriting positions form developmentally. The influence of instruction on hand position should be studied further before assuming the effects of maturation.

Significant relationships between handwriting positions and dominance were found, but the implications of such relationships are far from being clearcut. The most conspicuous implication is that teachers must realize that all children do not need to hold their writing tools in the same manner. Standard position should not be a goal, because the visual field must be a consideration along with hand dominance. Writers must be able to read what they are writing and if their hand obstructs the dominant field of vision, they are not going to be effective or enthusiastic writers.

Teachers can easily determine eye dominance as was done in this study. With that information along with the obvious hand dominance information on each child, teachers can demonstrate possible positions and allow children to deliberately choose a position that accommodates vision as well as legibility.

The only other significant findings in this study were the comparisons of reading and math achievement scores of mixed dominance students in two of the three school placements: regular and gifted (MWA) classes. The scores were obtained from the annual testing of a standardized battery and were obtained from a group testing situation. The scores of the total battery of reading tests and math tests were compared for these groups of students, resulting in significantly higher scores for math.

Brain organization as related to handwriting position may be a factor in the differences between reading and math scores. If mathematical functions are favored by the type of brain organization of children with mixed dominances, more information is needed on combinations of right handed-left eyed and left-handed, right eyed dominances. They were not separated in this analysis. Another question is related to the lack of significance of this comparison among students classified as learning disabled who have mixed dominances. The lack of significance may be simply a factor of the small population.

In summary, this study was intended as a description of handwriting positions, hand and eye dominances, and factors related to the efficient production of the mechanical process of handwriting among elementary students.

Clarification of the presence of different hand positions has been documented, questions have been raised regarding the roles of instruction and maturation in handwriting positions, and issues have emerged that deserve further attention. With these statements, it is hoped that interest has been generated in pursuing areas of research to ask and answer more questions.

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